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THE RELATION OF RATE OF MATURITY TO EGG PRODUCTION

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Ever changing economic conditions affecting the poultry industry stimulate a constant search by the producer of market eggs for means of reducing costs of production. The efficiency of the producing units is a very important factor influencing such costs.

Individual hens differ in egg-laying performance, and there are various ways of detecting the efficiency of egg production. The culling of hens after the first season's lay, on the basis of physical indications of past performance, is increasingly recognized as good flock-management practice. Yet, for a positive test of egg-laying ability, no method or equipment superior to the trap nest has been devised. Trap-nesting is a very necessary procedure in the process of developing and maintaining better producing flocks. Trap-nesting, however, is slow, expensive, and usually considered feasible only for pedigree breeding. For the commercial egg producer, a quicker and more practical method of eliminating the inefficient egg producers, before they have been maintained at a loss, is highly desirable.

The rate of maturity in pullets supplies a basis for determining their potential egg-laying ability and thereby furnishes a means of reducing the cost of egg production. Rate of maturity affords a gauge which makes it possible to eliminate most of the inferior individuals before housing space, feed, and labor have been used in determining their unprofitableness. Consequently, considerable unnecessary expense may be avoided by intelligent pullet segregation and culling before the birds have actually started to lay.

Previous Experimental Data.—As early as 1915, Rice[2] published an analysis of the three-year laying records of 169 White Leghorn hens, which indicate the marked correlation between earliness of maturity, on the one hand, and the rate and persistence of laying, on the other. The work of Kempster and Henderson,[3] in 1920–21 and 1922, making observations on 230 White Leghorn pullets, found that those laying the first egg when less than 175 days of age gave an average production of 168 eggs the first year; those coming into laying between 175 and 199 days averaged 162 eggs; 200 to 224 days, 153 eggs; 225 to 249 days, 146 eggs; 250 to 274 days, 125 eggs; and 275 to 299 days, 92 eggs. In 1921, Kennard[4] published a comparison of two lots of fifty birds each with reference to egg production, mortality, and the number of culls at the end of the first laying year. Lot 1 included the fifty earlier maturing pullets from a flock of three hundred, all hatched April 7, 1920; Lot 2 was made up of the fifty slowest maturing pullets from the flock. The latter were in good condition but backward; no weaklings were included. A partial summary of Kennard's results is presented in table 1.

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[1] Extension Specialist in Poultry.

[2] Rice, J. E. Distribution of egg production. Cornell Countryman, 12:5–8. 1915.

[3] Kempster, H. L., and E. W. Henderson. Length of period required to reach maturity as an indication of future egg production. Missouri Agr. Exp. Sta. Bul. 189:48, and Bul. 197:74. 1922.

TABLE 1

Comparison of Early and Late Maturing Pullets

(Data of Kennard.)

Lot number	Average first year egg production	Mortality	Culls September, 1922	Margin per bird over cost of feed after deduction of mortality and culling loss
1	160	0	4	$4.04
2	118	7	17	1.63

Kennard also concluded from this experiment that the earlier maturing pullets attained greater body weight and laid relatively larger eggs.

Such observations are suggestive even though the number of birds reported upon was not large, and they were not kept under commercial conditions. It was decided, therefore, to undertake pullet-segregation tests with large numbers of birds, in commercial flocks of Sonoma County, to determine the importance of rate of maturity as a factor in commercial flock management.

PULLET SEGREGATION TESTS IN SONOMA COUNTY

An effort was made to secure flocks between four and one-half and six months of age in which from 5 to 10 per cent of the birds were just beginning to lay. The success of the tests of necessity depended on the careful cooperation of the flock owners in maintaining the segregation and in keeping accurate records of production and mortality. It is not to be supposed that the results recorded are perfectly accurate. As the segregation was carried out it is not improbable that an occasional bird from an earlier maturing group escaped into the pen of later maturing birds, or the reverse. In the main, however, the cooperators were most careful and conscientious, and it is believed that the results recorded are truly representative. To insure the value of tests conducted and to guard against the possibilities of errors from various causes, these tests on commercial flocks were conducted for a period of three years and on eleven different farms.

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[4] Kennard, D. C. Early maturing vs. late maturing White Leghorn pullets. Ohio Agr. Exp. Sta. Mo. Bul. 6:163–167. 1921.

Basis of Segregation.—Each pullet was handled individually. Two characteristics were considered in segregating the birds: first, size and weight, and second, degree of sexual maturity. The characteristics noted as indications of sexual maturity were size and redness of the comb and wattles, and quality and extent of the body area between the pelvic bones and between the pelvic and keel bones. Each flock was considered as a unit and the segregation was based on the individual differences between the birds within the same flock. No weaklings which would ordinarily be considered as culls were included in the later maturing group.

FIRST TEST, 1921–22

On July 19 and 21, 1921, two flocks of Single Comb White Leghorn pullets, totaling over twelve hundred individuals, were segregated into two groups each, one group containing the earlier maturing and the other the later maturing birds. The segregation of the flocks was supervised by R. B. Easson, former Extension Poultry Specialist of the University of California. The pullets were well grown and were the product of average breeding and care. There was every indication that these flocks were developed normally and without undue stimulation or forcing to bring them into laying too soon or before they were properly developed. Also, there were no noticeable retarding influences. Between 5 and 10 per cent were beginning to lay at four and one-half months of age.

It was planned that the tests should be conducted for an entire year. However, for various reasons it was only possible to secure a record of three months and ten days on one flock and five months on the other.

Results of First Test.—The two flocks were segregated into approximately equal numbers of early and late maturing pullets, in order to accommodate the housing space of the cooperators. Although of different duration, the two records were combined during the months of August, September, and October, and averages figured accordingly. The purpose of this was to present a composite record for the longest period and the greatest number of birds possible. The total number of pullets averaged 1,171 for the five month period, August to December; 493 in the earlier maturing group and 678 in the later maturing group. During the five-month period the earlier maturing pullets laid 48.5 eggs per pullet as compared with 24.4 eggs each for the later maturing. In terms of value of eggs based on current Petaluma prices, assuming that all of the eggs laid by both groups were pullet eggs (19 to 22 ounces a dozen) the earlier maturing pullets returned a profit of 86½ cents per pullet more than the later maturing for the five-month period.

TABLE 2

Pullet-Segregation Test, 1921

Segregated July 19 and 21, 1921, at 4½ months of age.
Total average number of pullets for five-month period, 1171.

Month	Average number of eggs per pullet			Value of gain per pullet*
	Earlier maturing (493 pullets)	Later maturing (678 pullets)	Difference in favor earlier maturing pullets	
				(*Cents*)
August	10.7	3.0	7.7	23.58
September	13.1	8.6	4.5	15.60
October	10.3	7.9	2.4	8.44
November	8.2	3.4	4.8	19.32
December	6.2	1.5	4.7	19.55
Totals	48.5	24.4	24.1	86.49

* Value of eggs based on assumption that all eggs were pullet eggs (19 to 22 ounces a dozen).

Table 2 indicates production during each month, in eggs per pullet, the gain in eggs, and the value of gain of the earlier maturing pullets over the later maturing pullets.

To substantiate the assumption that these pullets were normally matured Single Comb White Leghorn pullets, attention is directed to the fact that the average egg production of these flocks during their sixth month was 21 per cent.

The production curve, figure 1, shows the consistent difference in intensity of egg production between the earlier and later maturing groups. Also the more sudden and much greater drop in production of the slower maturing group in the molting period of November and December is quite noticeable.

Cost Data.—During the same year cost data were obtained on one flock of 420 pullets which was segregated on July 21 at four and one-half months of age, 140 in the earlier maturing group and 280 in the later maturing group. The total actual expenditure on the 420 pullets up to eight months of age was $484.66, while the income from sale of eggs was $421.77. This particular flock at eight months of age had been carried at a loss of $62.89 or a net cost per pullet at eight months of 15 cents. However, figured on the basis of production from the different units of earlier and later maturing pullets, the more rapidly maturing pullets returned a profit of 11 cents per bird, while the later maturing pullets were carried at a loss of 28 cents per bird.

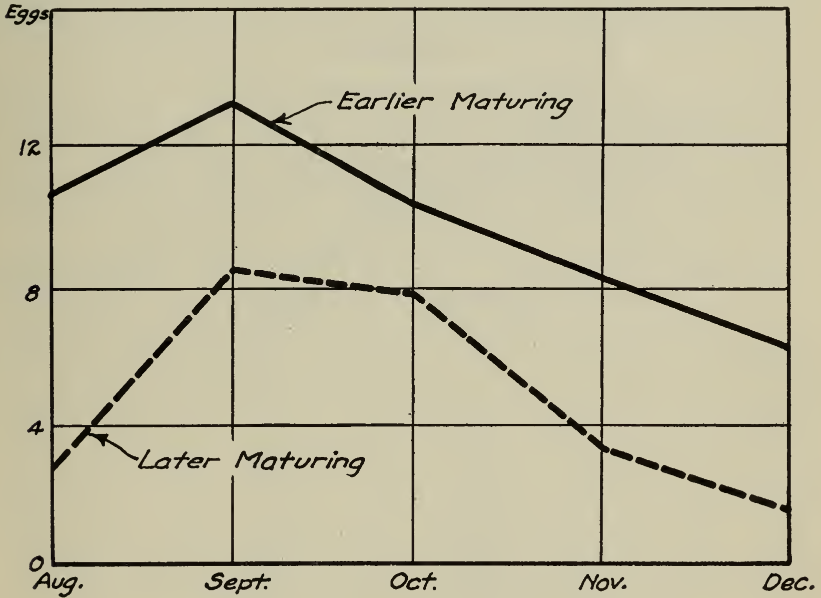

Fig. 1.—Illustrating table 2. Egg production per pullet in first test, 1921.

SECOND TEST, 1922–23

The results secured in 1921 appeared to be sufficiently interesting and valuable to warrant conducting another similar test on a larger scale to be continued if possible for one year. Consequently in the summer of 1922 seven flocks comprising 6,084 Single Comb White Leghorn pullets four and one-half to six months of age were secured for the second test.

Purposes of Second Test.—Purposes of the second test were four in number:

1. To secure further data on the differences in laying performance between earlier and slower maturing pullets.
2. To secure data on the relative mortality.
3. To secure accurate cost data.

4. To get some idea of the percentage of later maturing pullets, in a normally maturing commercial flock, which might profitably be culled out and disposed of at four and one-half to six months of age.

The method of segregation was the same as in the first test.

Results of Second Test.—The seven flocks were segregated during September 21, 1922, as follows: five flocks, comprising 3,976 pullets, were segregated into two groups, 1,955 or about 49 per cent in the earlier maturing, and 2,021 or 51 per cent in the later maturing group. The other two flocks comprising 2,107 pullets were segregated into three groups, 704 or 33 per cent in the earliest maturing group, 802 or 38 per cent in the medium-maturing group, and 601 or 29 per cent in the latest maturing group.

TABLE 3

PULLET-SEGREGATION TESTS, 1922–23

Two groups, segregated September 1 to 16, average age five months. Total average number of pullets, 3,557. * Four flocks.

Month	Average number of eggs per pullet		
	Earlier maturing (1,716 pullets)*	Later maturing (1,841 pullets)*	Difference in favor of earlier maturing pullets
September	5.	.8	4.2
October	7.5	3.2	4.3
November	7.4	6.4	.6
December	10.0	9.4	.5
January	15.2	14.6	.6
February	15.3	13.9	1.4
March	18.8	16.8	2.
April	18.2	13.8	4.4
May	19.0	12.4	6.6
June	15.2	12.3	2.9
Totals	131.6	103.6	28.0
Average mortality	14 per cent	20 per cent	6 per cent

* The total number of pullets and the number in each group refers to the average number in the test throughout the ten months period.

On four of the flocks which had been segregated into two groups, careful production records were kept for ten months by the cooperators. Table 3 gives the average egg production per pullet and the mortality in the two groups.

The average production of these flocks at six months of age was 17 per cent.

Figuring all costs of production on the basis of 60 per cent of the total cost being for feed and on the local prices for feed and eggs during the period in which the test was running (using Sonoma County Farm Bureau Egg Laying Contest costs and revenue figures as the basis) the later maturing group just about 'broke even,' whereas the earlier maturing group returned a net profit of approximately 85 cents per pullet over cost of feed, labor, depreciation on stock and equipment, and interest on investment.

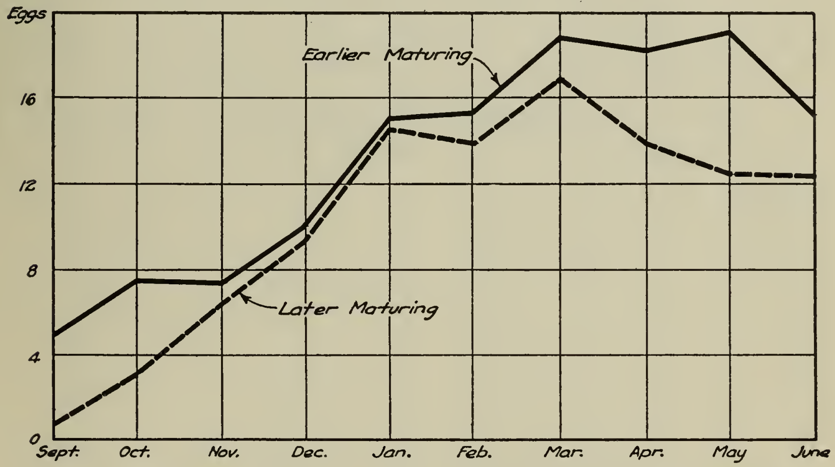

Fig. 2.—Illustrating table 3. Egg production per pullet in two-group segregation of the second test, 1922–23.

Figure 2 demonstrates very strikingly the superiority of the earlier maturing over the later maturing pullets in egg-laying ability. The spread between the curves after March shows this very conclusively; the later maturing were quicker to break and drop in production as well as being slower to start. Otherwise, with the exception of intensity, the trend in production of both groups is quite similar throughout the year.

The two flocks which were segregated into three groups each were kept for a similar ten-month period. The results in egg production and mortality are given in table 4.

The average egg production of these flocks at six months of age was 20 per cent.

Figuring on the same basis as before, the latest maturing groups in the flocks were run at a loss of approximately 38 cents a bird, while the medium maturing and earliest maturing groups returned a profit of approximately 32 cents and $1.15 per pullet respectively.

On the basis of egg production, although there may have been some profitable birds in the latest maturing group, there can be little doubt that as a group they were culls. Even though this group represented 29 per cent of the entire flock the owner would have lost less money had he disposed of them at the time of segregation. The remaining birds, in the earliest and medium-maturing groups, would no doubt have given better results because of decreased congestion in the houses and yards.

TABLE 4

PULLET-SEGREGATION TESTS, 1922–23

Three groups, segregated September 1, 1922, age five months, twenty days. Total average number of pullets, 2,039. Two flocks.

Month	Average number of eggs per pullet		
	Earliest maturing (690 pullets)	Medium maturing (779 pullets)	Latest maturing (570 pullets)
September	11.5	2.2	.3
October	12.5	8.6	2.6
November	14.5	12.6	10.3
December	12.9	11.3	10.1
January	13.4	13.5	11.8
February	14.2	13.1	12.2
March	16.0	15.1	12.5
April	15.5	15.0	11.5
May	14.7	13.0	10.0
June	13.8	9.8	9.6
Totals	141.0	114.2	90.9
Average mortality	3.6 per cent	5.3 per cent	9.0 per cent

In figure 3, as in figure 2, the trend in egg production in the earliest, medium, and latest maturing groups is similar, the later maturing groups being less intensive layers.

In studying table 3 or figure 2, it is interesting to note that in no month did the later maturing pullets lay as many eggs as the earlier maturing groups. Likewise, in the three-group segregation, with the exception of January, when the production per pullet in the medium-maturing group, was 0.1 per cent higher than in the earliest maturing group, the later maturing groups consistently laid less eggs than the earlier maturing groups.

The figures on mortality are just as indicative of relative quality although possibly less accurate, particularly since there seems to be a decided difference in the mortality report in the two and three-group segregations. In some of the flocks which were segregated into two groups a few of the pullets may have flown over to other pens and were consequently charged in on mortality. Yet it is believed that the degree of error is small since other records of a similar nature have shown considerable variation in mortality on different ranches. In this connection it must be borne in mind that these tests were not conducted under what might be considered as ideal experimental conditions. Nevertheless the figures on the whole can be considered reliable, because of the numbers involved, the care of the cooperators and the consistent results. Also the fact that the tests were conducted on commercial plants under thoroughly practical conditions, adds considerably to the practical value of the records.

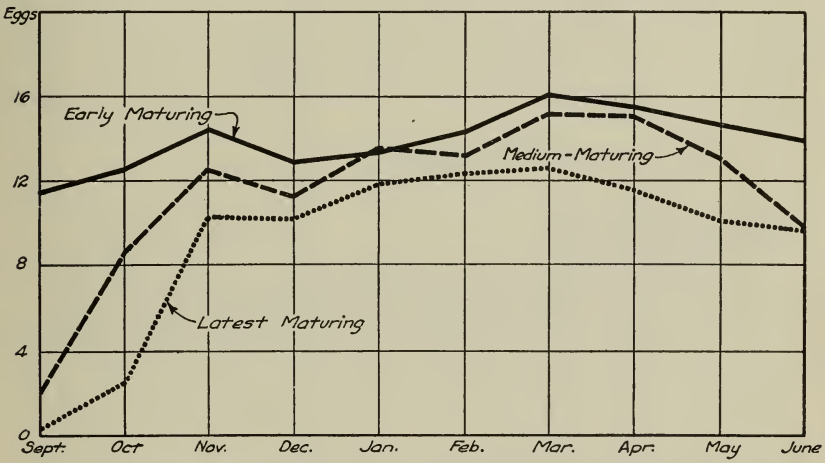

Fig. 3.—Illustrating table 4. Egg production per pullet in the three-group segregation of the second test, 1922–23.

Cost Data.—One of the cooperators whose flock was segregated into three groups kept careful cost data on each group for eight months of the ten. During the other two months, December and January, the three flocks were run together in the orchard to secure green feed and were again segregated. Records on the flock for this two-month period were not included. The second segregation entailed very little extra trouble since the birds in each of the three groups were leg-banded with different-colored leg bands at the time of the first segregation. These facts made complete segregation at all times certain, particularly since the cooperator was very careful. Figure 4 shows the cost data in terms of feed costs, interest, and depreciation on stock and buildings, mortality, gross return, and net profit or loss

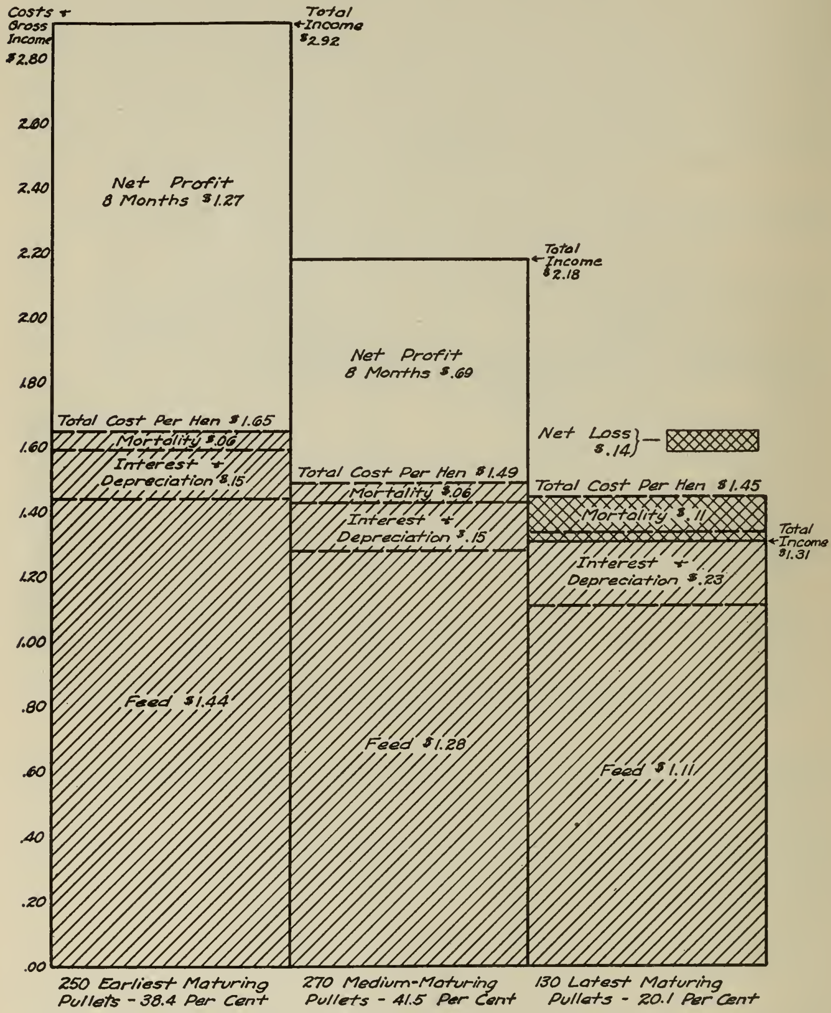

Fig. 4.—Cost and profit data (average per pullet) in one flock of the three-group pullet segregation, 1922–23. The flock was hatched March 5, and segregated August 28—age 5 months, 23 days. The item "Interest and Depreciation" covers both stock and buildings.

for each of the three groups of earliest, medium, and latest maturing pullets, for the eight months period.

The records as represented in figure 4 cover a total period of eight months and include all of the main costs except labor. Had the cost of labor been included the loss per pullet in the latest maturing group would have been at least 40 cents more, or 54 cents, and the profit on the other groups proportionately less.

The cost data on this flock shows that although the latest maturing group ate less feed per bird, the owner would have been much better off financially had they been disposed of on the market at the time of segregation. The owner of such birds should not hesitate because the birds are small and light and will bring very little on the market. It would be better to give them away than to keep them. Considering the returns on the eight-month period, the greater mortality, and other indications of weak vitality, the loss on such birds would no doubt be greater the longer they were kept. Also it is important to consider that the weaker individuals are more subject to infection and parasitic infestation.

Culling Data.—It was hoped that all of the cooperators would carry the test through for a twelve-month period and if possible some might be induced to carry the same birds through another year as segregated. However, at the end of the ten-month period most of the cooperators were beginning to plan on culling and refilling their houses to capacity. So on June 15, 1923, the three groups in the flock on which cost data was obtained were run together and culled by the Agricultural Extension Service[5] to secure further data on this basis.

As a part of the culling work the entire flock was again segregated into three groups: those which were thought to be worth keeping as breeders; those which were worth keeping as layers; and those which should be disposed of as culls. While the practice of selecting breeders so early is not to be recommended, it was done in this case at the urgent request of the cooperator. At the same time a careful record was kept of the number of the earliest, medium, and latest maturing pullets which were placed in each of the three groups. Table 5 and figure 5 show the results of this culling and the percentage of the earliest, medium, and latest maturing pullets which were placed in each of the three groups of breeders, layers, and culls.

It is interesting to note that half of the latest maturing pullets which were placed in the group of breeders, died before August 15, two months later. This indicates a lack of sufficient vitality to maintain heavy production, contrary to the favorable indications at the time they were culled. Similar observations were also made by Kennard and Kempster and Henderson in their work. We quote from Kempster and Henderson[6] as follows: "The early layer evidently had the ability to stand up better under the strain of heavy production."

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[5] This work was supervised by W. E. Newlon, Extension Poultry Specialist, University of California.

TABLE 5

CULLING DATA ON ONE OF THE THREE-GROUP SEGREGATIONS

Showing the percentage of breeders, layers, and culls obtained from each of the earliest, medium, and latest maturing groups and the entire flock. Flock culled June 15.

Group	Earliest maturing	Medium maturing	Slowest maturing	Entire flock
	per cent	*per cent*	*per cent*	*per cent*
Breeders	34.8	17.5	4.0	22.3
Layers	52.3	51.7	55.7	52.7
Culls	12.8	30.8	40.2	25.5

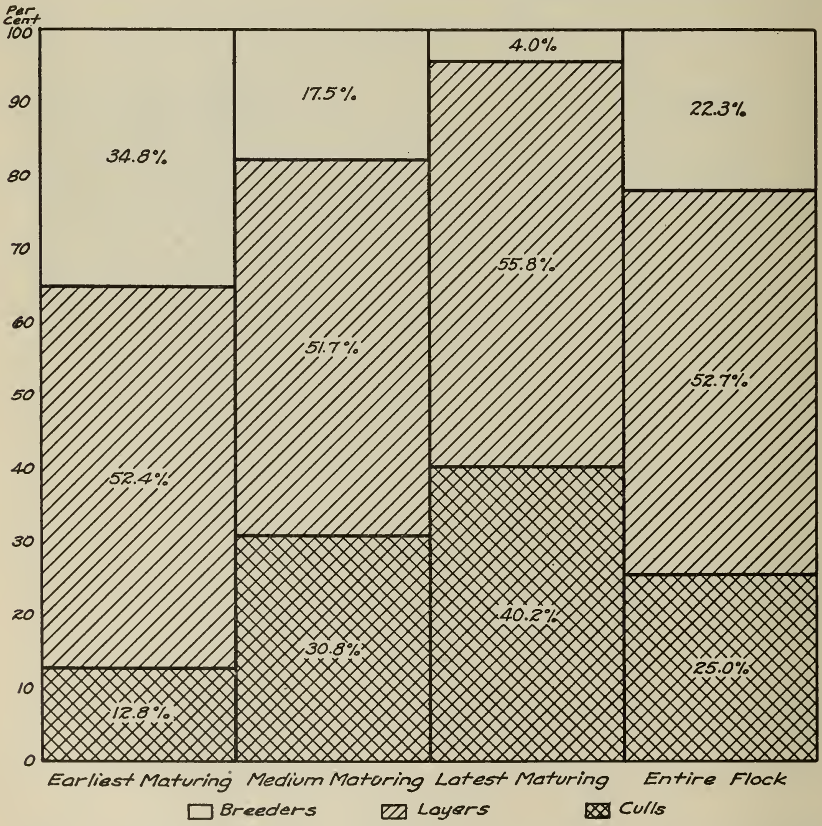

Fig. 5.—Illustrating table 5. Culling data on one of the flocks in the three-group segregations of the second pullet test. The flock consisted of 577 pullets. They were culled June 15, at 15 months of age.

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[6] *Op. cit.*

IMPORTANCE OF SEGREGATION

Very seldom, at least under commercial conditions, is it possible to raise a flock of pullets which are uniform in size and development. In the average Single Comb White Leghorn pullet flock a few may start to lay between four and five months, the majority before seven, and some not until from eight to ten months of age. Consequently, in any consideration of the problem of pullet segregation and culling, emphasis should be placed on the value of segregation. Pullets which are more nearly uniform in size and sexual development will do much better when placed in a group by themselves. This is particularly true of the slower developing pullets. It is almost as important for the commercial poultryman to segregate the late maturing pullets from the early maturing pullets at four and one-half to six months of age, as it is to segregate the cockerels from the pullets at five to eight weeks of age. Slower, weaker individuals would thus have a better opportunity at feed and would not be annoyed and bullied by the larger individuals.

FACTORS INVOLVED IN RATE OF MATURITY

In the discussion thus far emphasis has been placed on normal maturity. It is probable that similar results would be obtained where the pullets develop more slowly than normal. But it is doubtful if the same results would be obtained where the pullets are stimulated into sexual maturity before they have attained good body weight. In the latter case it is probable that the earliest maturing birds would be inferior at least to the medium-maturing birds, because of their tendency to be smaller and weaker, and to lay smaller eggs for a greater period at the start and throughout their lifetime. There are two groups of factors which are of importance in affecting the rate of maturity: genetic factors and physiological factors.

Genetic factors are important in that early maturity may be effected by selection. Except for a small percentage of early freaks, inherent early maturity is very desirable. In fact early maturity when correlated with vigor and good body development may be considered as an indication of good breeding. This emphasizes the importance of pullet segregation in the selection of breeders.

Among physiological factors, both retarding and abnormally stimulating influences are detrimental to economical results. Physical growth and sexual maturity may be retarded by extreme temperatures in incubation of eggs or in brooding of the chicks; crowding; faulty ventilation, such as lack of sufficient fresh air; poor sanitation; or improper feeding which fails to supply the necessary nutrients for proper growth during the brooding period. Parasitic infestation, particularly coccidia and round worms, serve to handicap maturity. Late hatched chicks (April 1 to June 15) often mature more slowly than those hatched earlier (December 15 to April 1). The principal stimulating influence is the feeding of an unbalanced ration containing too much animal protein, particularly when associated with some of the retarding influences which result in sex being prematurely developed before good body development is obtained.

RATE OF MATURITY AS RELATED TO SIZE OF EGGS

The pullet-segregation tests as described above show that the early maturing birds will lay a larger number of eggs. However, in none of these tests were records kept on the comparative size of eggs laid by birds in each group. Consequently, the relative value of eggs laid by early and late maturing birds was not definitely known. To obtain information on this subject two flocks were segregated in the early fall of 1924, the owners of which agreed to keep careful records not only on the total number of eggs and mortality but also the relative size of eggs laid by each group. These flocks comprised 1621 and 1070 pullets, which are hereafter referred to as flocks A and B respectively.

Test, Flock A.—The flock comprising 1621 pullets was segregated on August 21, 1924, at six months of age; 424 pullets, the largest and earliest maturing in the flock, were placed in group 1; 417, later and medium-maturing, were placed in group 2; and 780, the latest maturing, were placed in group 3. Each group was kept in a separate house, all of the same type and having the same floor space per bird. The flock owner cooperated by keeping very careful records on the three groups for eight months. The record keeping was supervised very closely by a representative of the Agricultural Extension Service and the records collected each month. Table 6 gives a detailed summary of the number of eggs per hen, size of eggs, value of eggs, and mortality in each group during the eight-month period from September 1 to April 30. The size of eggs is given in percentage; No. 1 eggs being those which weighed 22 ounces or more per dozen; No. 2, from 19 to 22 ounces; and No. 3, less than 19 ounces per dozen. The value of eggs was based on the current average monthly quotations for each size of eggs as paid by the Poultry Producers of Central California to producers in this district during this period.

TABLE 6

PULLET-SEGREGATION TEST, 1924–25, FLOCK A

Three-group segregation at six months of age.

Month	Eggs per pullet			Size of eggs, per cent									Value of eggs			Per cent mortality		
				Group 1			Group 2			Group 3								
	Group 1	Group 2	Group 3	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
Sept.	12.7	3.5	.7	3	39	58	3	43	54	4	38	58	.30	.08	.02	.0	.0	.2
Oct.	13.4	9.2	6.2	18	60	22	20	61	19	20	62	18	.44	.31	.20	.0	.2	.3
Nov.	12.0	12.5	10.7	44	51	5	48	49	3	60	54	6	.46	.49	.41	.2	.0	1.4
Dec.	14.1	14.5	13.7	68	31	1	70	28	4	64	35	1	.55	.56	.53	.5	.0	.8
Jan.	18.1	16.6	15.6	75	24	1	77	22	1	70	29	1	.71	.70	.61	.2	1.0	.4
Feb.	17.4	15.9	15.2	73	26	1	74	25	1	68	30	2	.47	.43	.41	.2	1.2	.1
Mar.	18.0	16.4	16.0	68	31	1	71	28	1	66	32	2	.41	.38	.37	.2	1.0	1.6
Apr.	7.0	6.1	6.0	75	24	1	77	22	1	72	27	1	.16	.14	.14	?	?	?
Totals	112.7	94.7	84.1										3.50	3.09	2.69	1.3	3.4	4.8

NOTE: Group 1 comprised 424 earliest maturing pullets; group 2, 417 medium-maturing pullets; and group 3, 780 latest maturing pullets.

No. 1, No. 2, and No. 3, under "Size of eggs," refer to the 22 ounces and over; 19 to 22 ounces; and less than 19-ounces per dozen eggs, respectively.

TABLE 7

AVERAGE NUMBER OF EGGS OF EACH SIZE AND TOTAL NUMBER OF EGGS BY GROUP, PULLET-SEGREGATION TEST, 1924–25, FLOCK A

Eight-month period, September to May.

Group	No. 1 eggs per pullet	No. 2 eggs per pullet	No. 3 eggs per pullet	Total number eggs all sizes
1	61.4	39.6	11.7	112.7
2	59.2	31.0	4.5	94.7
3	50.5	30.5	3.2	84.1

NOTE: Groups 1, 2, and 3 refer to the earliest maturing, medium-maturing and latest maturing group, respectively. No. 1, No. 2, and No. 3 eggs weigh 22 ounces and over; 19 to 22 ounces; and less than 19 ounces per dozen eggs, respectively.

Figure 6 shows:

1. The total average number of No. 1, No. 2, and No. 3 eggs per bird and the total average number of eggs per bird laid by each group.

2. The percentage of No. 1, No. 2, and No. 3 eggs laid by each group, based on the average production in each group.

3. The total value per bird of No. 1, No. 2, and No. 3 eggs, and the total value of all eggs per bird in each group.

4. The average mortality in each group.

The earliest maturing pullets (group 1) in flock A laid a larger number of each size of eggs and consequently returned a greater revenue per bird than the later maturing pullets (groups 2 and 3). However, the latest maturing birds (group 3) comprising approximately 50 per cent of the flock, laid a larger percentage of No. 1 eggs than the earliest maturing, which included approximately 25 per cent of the flock, although group 1 laid a larger number of each size of eggs than group 3. It will also be noted that group 2, the second earlier maturing birds, comprising 25 per cent of the flock, laid not only a larger number of eggs per bird of all sizes than group 3, but also a larger percentage of No. 1 and No. 3 eggs. Therefore, it would appear that the earliest and the latest maturing pullets lay relatively smaller eggs than the medium-maturing pullets.

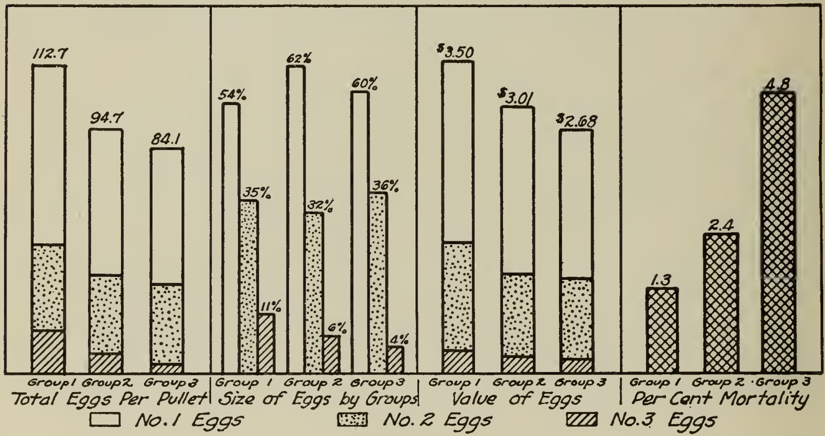

Fig. 6.—Illustrating tables 6 and 7. Total number, size, and value of eggs, and mortality, in earliest (1), medium (2), and latest maturing groups (3); flock A, of three-group segregation in pullet-test, 1924–25.

Test, Flock B.—The second flock, comprising 1070 pullets, was segregated at six months and ten days of age, on September 4, 1924, into three groups, as follows: 745, hereafter designated as group 1, the earlier maturing birds; 270 (group 2), later maturing, and 55 (group 3), the latest maturing. The owner was advised by the representative of the Agricultural Extension Service making the segregation to sell the 55 latest maturing birds as culls. The owner, however, decided to keep these as a part of the test but no definite production records were kept on this group. On July 8, 1925, only 13 of the birds remained in the cull group, the other 42 having died during the ten-month period. Complete records similar to those kept on test flock A were kept on the first two groups of this flock during nearly a complete nine-month period, from September 5 to May 31, and are summarized in table 8.

TABLE 8

PULLET-SEGREGATION TEST, 1924–25, FLOCK B

Three-group segregation. Segregated at six months ten days of age. Group 1, 745 earlier maturing and group 2, 270 later maturing pullets. Records on 55 latest maturing pullets not included.

Month	Eggs per hen		Size of eggs, per cent						Value of eggs		Per cent mortality	
	Group 1	Group 2	Group 1			Group 2			Group 1	Group 2	Group 1	Group 2
			No. 1	No. 2	No. 3	No. 1	No. 2	No. 3				
September	9.9	.4	5	45	50	8	49	43	$ .26	$ .01	.8	0
October	11.2	7.9	18	59	23	33	53	14	.36	.28	.8	.7
November	12.1	8.1	47	49	4	42	49	9	.51	.31	.8	1.1
December	14.0	10.3	71	28	1	65	33	2	.54	.40	3.1	2.3
January	14.4	12.1	80	20	.3	71	28	.7	.58	.50	1.	.4
February	14.0	9.9	81	19		75	25		.38	.27	1.39	1.93
March	15.4	11.3	74	29		71	29		.36	.26	.7	1.2
April	12.2	8.4	71	29		70	30		.27	.19	1.8	1.6
May	11.28	9.34	74	26		70	30		.27	.23	1.5	4.1
Totals	115.5	77.7							$3.53	$2.45	11.9	13.3
Averages			58	33.3	8.7	56.1	36.2	7.7				

In flock B the earliest maturing pullets (comprising approximately 70 per cent of the entire flock) laid a higher average percentage of No. 1 eggs and also a higher percentage of No. 3 eggs than those in group 2 (comprising about 25 per cent of the flock). The earliest maturing pullets laid a smaller percentage of medium-sized or No. 2 eggs. Otherwise, the results in flock B are similar to those obtained in flock A.

It may be concluded from these tests that the earlier maturing birds in a pullet flock, as indicated by physical and sexual development at approximately six months of age, will lay a larger number of each size of eggs than the later maturing birds in the flock. A small percentage of the earliest maturing pullets will lay relatively smaller eggs than the later maturing birds, on the basis of relative number of the different sizes of all eggs laid. The medium-maturing pullets will lay a larger percentage of large eggs than the earliest and latest maturing and a larger number of eggs than the latest maturing pullets. However, it is apparent that the earlier maturing pullets will return a greater gross revenue from sale of eggs than the later maturing pullets.

Hen Culling Test.—On July 8, 1925, the hens in groups 1 and 2 of test flock B were combined in the same house and culled by a representative of the Agricultural Extension Service. This work was checked by two persons well trained in poultry culling. At this time birds in this flock were approximately sixteen months of age. The methods used in culling were those recommended by the University of California and based on an interpretation of the physical characteristics of each bird handled individually. A total of 26 per cent of the flock was culled out as unprofitable producers. On checking the number of early maturing and medium-maturing pullets in this 26 per cent it was found that only 18 per cent of the early maturing pullets (group 1 in the test) had been culled out as against 50 per cent of the later maturing (group 2 in the test).

CONCLUSIONS

1. Rate of maturity is a good gauge of potential egg-laying ability of Single Comb White Leghorn pullets in commercial flocks.
2. In a normally maturing Single Comb White Leghorn flock the earlier maturing pullets will lay a larger number of eggs during the first year's production, and very probably thereafter.
3. The later maturing pullets are slower to start and quicker to drop in egg production.
4. The earlier maturing pullet possesses greater vitality.
5. The easiest and probably the best time to segregate pullets is at four and one-half to six months of age or at about the time 5 to 10 per cent of the birds are beginning to lay.
6. Each of the segregated groups, particularly the later maturing pullets, will develop much better after segregation.
7. Pullet segregation should be practiced by commercial poultrymen where it is possible to obtain the equipment without too much trouble and expense.
8. Segregation assists in a more systematic and intelligent culling of the flock, the following summer.

9. Segregation assists in selecting the best birds in the flock for breeding purposes, since a large percentage of the strongest and heaviest individuals and the most consistent egg producers come from the earlier maturing pullets.

10. At least 10 to 15 per cent of the latest maturing birds in the average Single Comb White Leghorn pullet flock should be culled out at four and one-half to six months of age and disposed of as unprofitable egg producers.

11. The earlier maturing pullets lay a greater number of each size of eggs than those maturing later.

12. Medium-maturing pullets lay a greater percentage of large eggs than either the earliest or latest maturing pullets, and a greater number of eggs than the latest maturing.

13. The earlier maturing pullets return a greater revenue from sale of eggs than the later maturing pullets.

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